EOSDIS Core System Project

Flight Operations Segment (FOS) Release B Training and Certification Plan for the ECS Project

August 1997

Hughes Information Technology Systems
Upper Marlboro, Maryland

FOS Release B Training and Certification Plan
for the ECS Project

August 1997

Prepared Under Contract NAS5-6000
CDRL Items #128 and #130

APPROVED BY

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Preface

This document is a contract deliverable with an approval code of 2. As such, it does not require formal Government approval, however, the Government reserves the right to request changes within 45 days of the initial submittal. Future changes to this document shall be made by document change notice (DCN) or by complete revision.

This document combines ECS CDRL items 128 and 130 (FOT Release B Training Plan and FOS Release B Certification Plan). NASA and the ECS FOT Management have agreed that the interrelationships between the Training Plan and Certification Plan calls for combining these CDRLs. If they were prepared as two separated deliverables much of the information contained in these two documents would be redundant.

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Abstract

This ECS FOS Release B Training and Certification Plan (DID 622/OP2 and DID 626/OP2) addresses the development and implementation of the training and certification program for FOS Release B. It also provides direction on general processes and policies of the ECS Flight Operations Team (FOT) training and certification program. The training and certification addressed in this plan is related to the specific system design, components and operation of FOS Release B and does not include training on management and personal development. Note that AM-1 Spacecraft specific training will be provided by the Spacecraft manufacturer.

*Keywords***:** training, certification, instructional design, train-the-trainer, courseware, just-in-time, OJT

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1. Introduction

1.1 Identification

The ECS Training Plan, Contract Data Requirements List (CDRL) Item 128, whose requirements are System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-6000).

The ECS Certification Plan, Contract Data Requirements List (CDRL) Item 130, whose requirements are specified in Data Item Description (DID) 626/OP2, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-6000).

1.2 Scope

The FOS Release B Training and Certification Plan is part of the overall ECS Training Program. This plan defines training requirements as it relates to the operations and maintenance of ECS FOS Release B by the ECS FOT. The scope of this plan will include direction on general processes and policies of the FOT Training Program and will be limited to the FOS Release B software and hardware design for supporting AM-1 mission operations. Training on management and personal development will not be included in this document. This plan provides procedures and standards to coordinate and monitor the AM-1 Technical Training and Certification.

This plan does not include AM-1 Spacecraft specific training. AM-1 Spacecraft specific training will be provided by the spacecraft manufacturer. It is expected that the first draft of the AM-1 Spacecraft training materials will be available for review by ECS in November 1997.

This document is to be used by all members of the ECS FOT.

This document reflects the August 23, 1995 Technical Baseline maintained by the contractor Configuration Control Board (CCB) in accordance with ECS technical direction #11, dated December 6, 1994.

1.3 Purpose

This plan describes the responsibilities and processes for preparing and executing FOT staff training to operate the ECS FOS Release B system, to satisfactorily accomplish operations for the AM-1 mission. This Plan also provides management and employees with a reference document for technical training.

In addition, the training plan provides direction on gathering training requirements, assessing the needs of the training population, determining training sources, developing training courseware, delivering and evaluating the Training and Certification, and certifying designated personnel

The program and the plan are used to coordinate and integrate training activities to increase the effectiveness and efficiency of the FOT. It also provides information for management to use in evaluating the consistency and appropriateness of employee performance. Performance standards and procedures can be evaluated by comparing training performance with overall performance.

1.4   Status and Schedule

This plan provides information about the Training and Certification for FOS Release B.

1.5   Organization

This document is organized as follows:

Introduction (Section 1): This section presents the document identification, scope, purpose, status and schedule, and organization.

Related Documentation (Section 2): This section identifies parent, applicable and information documents associated with this plan.

Training Program Management (Section 3): This section describes the processes and procedures that will be used to implement the training program.

Training Population (Section 4): This section describes the total population that the ECS training program will address.

Release B Training Program (Section 5): This section describes the requirements and implementation of training for Release B.

Release B Certification Plan (Section 6): This section describes the Certification Plan for Release B.

2. Related Documentation

2.1   Parent Document

The parent document is the document from which the FOT Training Plan's scope and content are derived.

423-41-01   Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work

2.2   Applicable Documents

The following documents are referenced within this FOT Training Plan, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

420-05-03   Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS) through CH-11.

423-41-02   Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), through CH-50.

2.3   Information Documents

2.3.1 Information Documents Referenced

The following documents are referenced herein and, amplify or clarify the information presented in this document. These documents are not binding on the content of the FOT Training Plan.

535-TIP-CPT-001   Goddard Space Flight Center, Mission Operations and Data Systems Directorate (MO&DSD) Technical Information Program Networks Technical Training Facility, Contractor-Provided Training Specification.

500-1002   Goddard Space Flight Center, Mission Operations and Data Systems Directorate (MO&DSD) NMOS Certification Program.

2.3.2 Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Plan.

601-CD-001-004   Maintenance and Operations Management Plan for the ECS Project

604-CD-001-004   ECS Operations Concept for the ECS Project: Part 1-- ECS Overview

604-CD-003-001   ECS Operations Concept for the ECS Project: Part 2A -- ECS Release A

605-CD-003-001   Operations Scenarios for the FOS: Release-A, Release-B, for the ECS Project

607-CD-001-002   Maintenance and Operations Manual for the ECS Project

609-CD-005-003   Flight Operation Segment (FOS) Operations Tools Manual: FOS Release B

3. Training Program Management

This section identifies the policies, processes and procedures of the FOT training and certification program and provides general training management information applicable for the life of the contract.

The training and certification program addresses the training of certified and non-certified FOT personnel. A certified position is a position that includes performance of any system critical operations task. Non-certified positions are all other FOT positions, Instrument Operations Teams, National Aeronautics and Space Administration (NASA) management and technical personnel, and independent verification & validation (IV&V) contractor personnel.

The FOT training program is established based on the following principles:

FOT training will be designed or selected to ensure that FOT personnel can effectively maintain and operate the ECS system and meet the certification standards specified in the FOT Certification section of this document.

- •   User training will be designed or selected to meet needs determined from analyses of user populations by the AM-1 NASA Flight Operations Director.

- •   The training program will employ the lowest cost training options that satisfy performance and certification need.

- •   Training will be scheduled "just-in-time" to achieve maximum retention of knowledge for application on the job.

- •   FOT certification has been designed to ensure that FOT personnel meet the certification standards specified in the Certification Plan section of this document.

3.1   Responsibilities/Organizational Interfaces

The FOT training program will be centrally managed by the ECS FOT organization.

3.2   FOT Training Organization

The FOT training organization consists of elements of the FOT operations staff.   These elements include the FOT Management (FOT Manager, Flight Systems Engineer, Operations Manager, and Ground System Engineer), Training Coordinator, instructional designers/trainers, and OJT Instructors.

The FOT Training Organization structure provides a system of checks and balances that is critical to the success of the FOT Training Program. Because all participants have clearly defined responsibilities, any conflicts between training objectives and near-term mission support are resolved quickly.

3.3 FOT Management

FOT Management is responsible for developing and maintaining an adequately trained staff. They accomplish this task through employee participation in the FOT Training Program. In addition, FOT Management is also charged with developing objectives and procedures for the crosstraining, development of personnel across organizational lines, and consulting with the Training Coordinator concerning the goals and results of the Training Program.

Management has the responsibility and opportunity to ensure that the FOT Training Program is effective. They have direct, daily interaction with the employees, and they have firsthand knowledge of the day-to-day activities within their organization. Furthermore, management has the technical expertise required to develop training materials for their employees. By working with their senior and lead personnel, they are able to tailor the program to the requirements of their respective organizations. If tailoring is not effective or practical, they have the responsibility to communicate the nature of any problems to their management.

Management, and senior technical staff, are major participants in the implementation of the training materials within this plan and will revise checklists and on the job training as procedures and/or equipment are upgraded. They are also responsible for documenting, recording, and communicating the information associated with the training effort to management and the training coordinator. Their feedback is a critical element in the evaluation of the overall effectiveness of the training program.

3.3.1 FOT Training Coordinator

The FOT Training Coordinator is responsible for the management of the FOT training program. Specifically the Training Coordinator is responsible for communicating training objectives and opportunities in a clear and objective manner, monitoring and recording various activities, and ensuring adequate feedback for evaluation of the overall effectiveness of the program. The FOT Training Coordinator is responsible for the routing, review, and recording of training forms, records, and reports within the FOT.

Responsibilities for this position include the following:

- Monitor Training Activities Provide Feedback for Evaluation of Training Program Progress.

- Develop certification skills documentation and plan.

- Implement and manage operator certification as defined in the certification plan.

- Develop curriculum.

- Interface with system development and operations Engineers to obtain technical information.

- Schedule training course.

- Conduct scheduled training courses.

- Coordinate all training activities with NASA, AM-1 Spacecraft manufacturer, IV&V, and FOS developers.

- Manage any needed COTS training.

- Collecting training requirements for FOT personnel based on training and certification requirements identified.

- Supporting OJT instructors, and providing them with OJT materials.

- Coordinating training classes, including arranging classroom space, materials and training equipment; coordinating the use of training equipment consistent with operational requirements, and; compiling class rosters.

- Maintaining training and certification records for FOT operations personnel.

- Providing student evaluations of training to FOT Management.

- Providing any recommendations to FOT management for improvements in the training program.

3.3.2 Trainers

The FOT training organization will include instructional designers/trainers. These are part-time duties assigned to qualified FOT individuals. Their responsibilities are the following:

- Identify training requirements for instructing FOT functions.

- Develop training materials using instructional system design processes by NASA standards.

- Develop lists of certification criteria (see Section 3.3.1.1) for FOT positions as defined by the Certification Plan (DID 626).

- Develop course evaluations.

- Develop training and certification tests.

- Assist the Training Coordinator in writing training plans.

- Provide technical instruction.

- Training and certifying OJT instructors (see Section 3.3.1.6.1).

3.3.3 OJT Instructors

OJT instructor positions are part-time duties assigned to qualified FOT staff. These individuals will provide their expertise to instruct/monitor new staff personnel. The OJT staff members are considered to be subject matter experts capable of one-on-one assistance to a student, using instructions and materials provided by the FOT training organization.

3.4   Training Program Development

The development of the FOT training program includes addressing the training needs related to certified and non-certified training populations.

3.4.1   Training & Certification Development Process

Key FOT personnel will be certified prior to operational assignment. Selection of the positions requiring certification is defined in the Certification Plan (CDRL 626) section of this document. Certification is the verification through written, oral and/or performance evaluation, that an individual meets the minimum level of proficiency necessary to perform the duties associated with a system, subsystem or position. Most personnel will require some training to prepare for this requirement. The training program for these personnel is designed to satisfy the certification requirement.

Figure 3.4.1-1 depicts the relationships between system design, certification and training. These relationships are described in subsequent sub-sections.
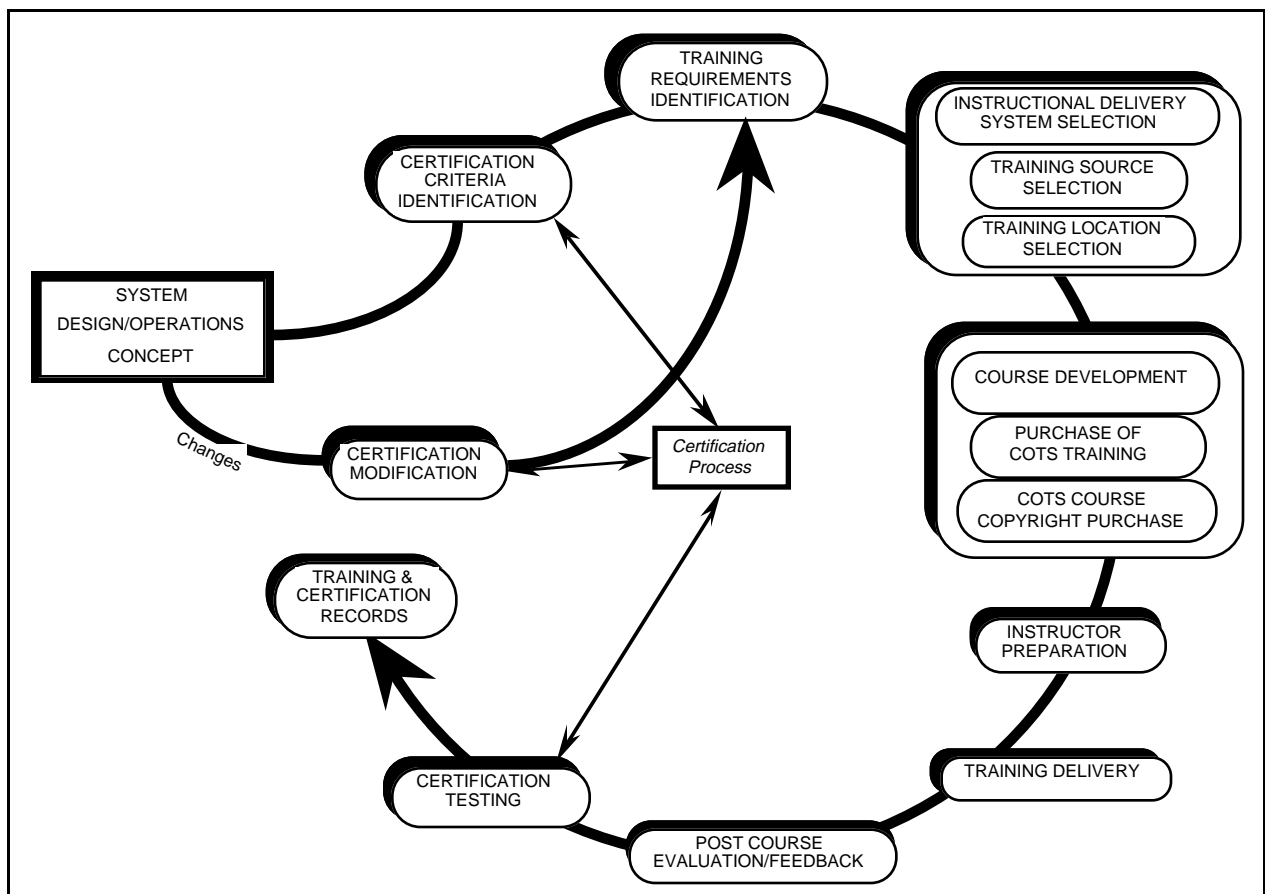
Figure 3.4.1-1. FOT Training and Certification Design Process

3.4.1.1 FOT Training Requirements Identification

For certain FOT positions key tasks will be identified as system critical and will be included in the course training requirements as well as defined in the Certification Plan (CDRL 626) section of this document. For personnel in support positions, training requirements will be determined based on job descriptions and the characteristics of the design (i.e. specific subsystem functions and system components related to the position).

3.4.1.1.1 Defining Training Objectives

Once the key FOT tasks have been selected, lesson objectives will be developed. Each lesson objective will consist of an action, condition and standard and will be used to develop the training course material. Common objectives will be grouped by subject into modular lessons which will be taught to appropriately selected operators.

3.4.1.1.2 Recommended Training Path to Certification

Using the certification criteria and the training requirements identified, a recommended training path to certification will be created for each FOT position requiring certification. This path will list the courses/lessons recommended to provide the skills necessary to become certified. Not all the lessons on the list will be required for everyone. The recommended path is intended to assist management in determining training solutions on an individual basis.

3.4.1.2 Selection of Instructional Delivery Systems

Once training requirements have been determined and objectives defined, an instructional delivery system will be chosen to best meet the requirement for the training audience. The primary instructional delivery systems are classroom (CR) training, and OJT. COTS training will be utilized by the FOT when internal expertise is unavailable. Figure 3.4.1.2-1 depicts the procedure for selecting instructional delivery systems.

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│              │  Training objectives       │                       │
│              │  derived from certification│                       │
│              │  criteria                  │                       │
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│                              ▼                                    │
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│                    │  CR,  and OJT     │                          │
│                    │  considered as possible                     │
│                    │  instructional delivery                     │
│                    │  systems          │                          │
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│                              │                                    │
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│         │ Instructional delivery systems analyzed     │           │
│         │ based on:                                   │           │
│         │   •  Development / implementation time      │           │
│         │   •  Geographic dispersion of students      │           │
│         │   •  Resource coordination (instructors,    │           │
│         │      facilities, equipment, time)           │           │
│         │   •  Effectiveness of training type         │           │
│         │   •  Cost                                   │           │
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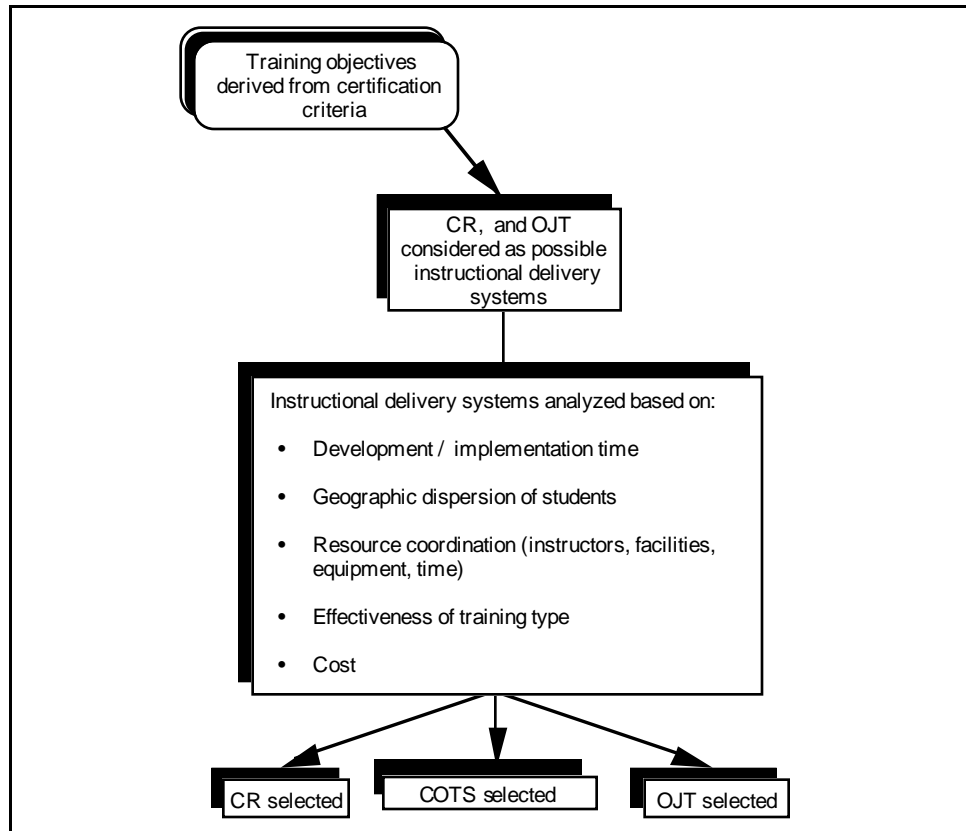
Figure 3.4.1.2-1. Instructional Delivery System Selection Procedure

3.4.1.2.1 CR Training

CR Training will be selected in cases where it is determined that the classroom environment is the most effective media for learning; the costs associated with such training over time are beneficial; and it is logistically feasible to assemble students and equipment in a single training location.

Classroom training is used to help students understand why they perform tasks in a prescribed manner and what to expect if they deviate from standard procedures. Interaction with a technically qualified instructor and other students provides FOT personnel with information not obtainable from on-the-job training or individual study. While classroom training encourages discussion, it is also characterized by formally defined objectives and documentation. It uses a variety of teaching aids but primarily utilizes video taped sessions relative to specific topics relevant to the employees position. The classroom training sessions are defined for each position to provide background information Additionally, specific training pertinent to the position. Each session provides the employee the opportunity to take a quiz containing questions covering the key elements of the classroom session.

FOT developed CR training will be designed in accordance with Section 3.1 of the Contractor Provided Training Specification. Training materials will generally include the following, although some items may be consolidated:

- Classroom Objectives

- Instructional Guide

- Reference Documents

- Positional Console Training Tools

- Operational Procedures

- Practical Exercises

3.4.1.2.2 OJT

On-the-Job (OJT) training is the least formal, least structured type of training. It is the easiest training to tailor to the requirements of the trainer and the students. It can vary not only from day to day but also from student to student. It may be based on comprehensive notes and documentation, or it may be presented solely on the basis of the instructor's experience and expertise. Figure 3.4.1.3.2-1 depicts the OJT procedure.
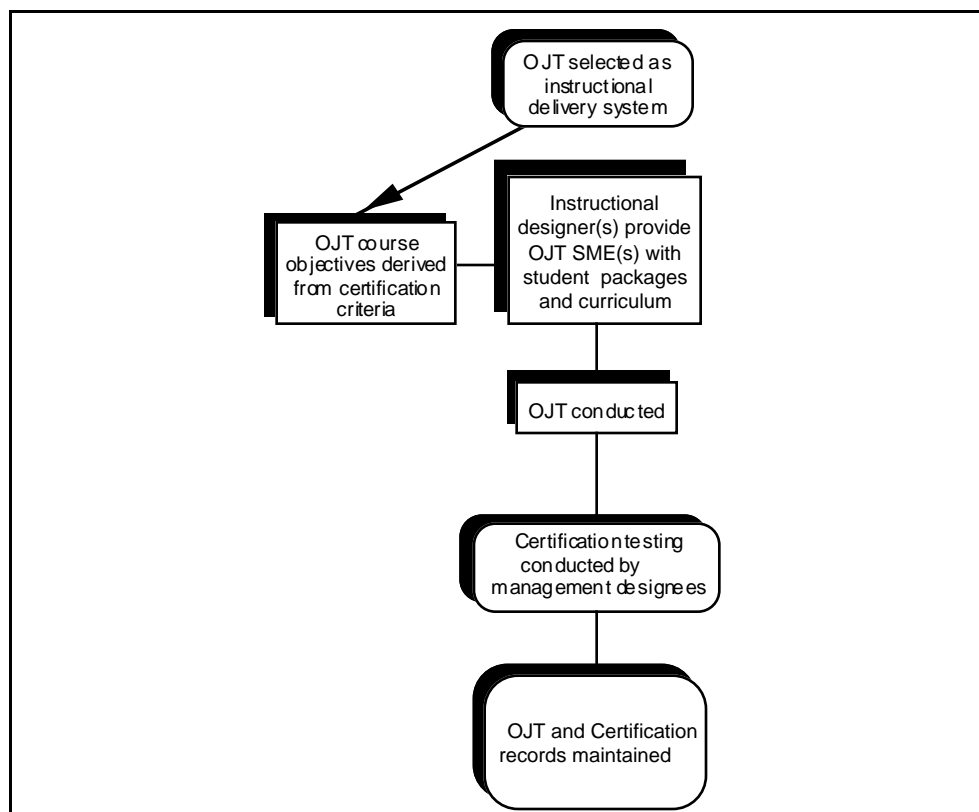

Figure 3.4.1.2.2-1. OJT Procedure

In OJT, the student acquires job skill proficiency under actual job conditions, while tutored by an FOT expert. The expert, or "OJT instructor" is selected based on demonstrated knowledge and skill in the subject matter, and on instructional ability. Remedial instruction will be performed on an as needed basis by the expert. The expert can use the following materials derived from CDRL 625 Training Materials:

- Objectives

- Student Guide

- Reference Documents

- Positional Console Training Tools

- Operational Procedures

- Practical Exercises

- Evaluation and recording requirements

3.4.1.3 Training Source Selection

To satisfy a training requirement, the FOT training program can rely on several sources. An FOT training library (located at the EOC) will be developed, which will contain course materials from courses that have been developed by the FOT. Training material from the AM-1 spacecraft manufacturer will also be located in the FOT training library. Training materials may be developed by the FOT internally to satisfy a requirement; this is particularly relevant in cases where the training requirements are specific to FOS and the FOT or to project-developed components of the system. Figure 3.4.1.3-1 depicts the decision factors involved in determining the source for satisfying a training requirement.
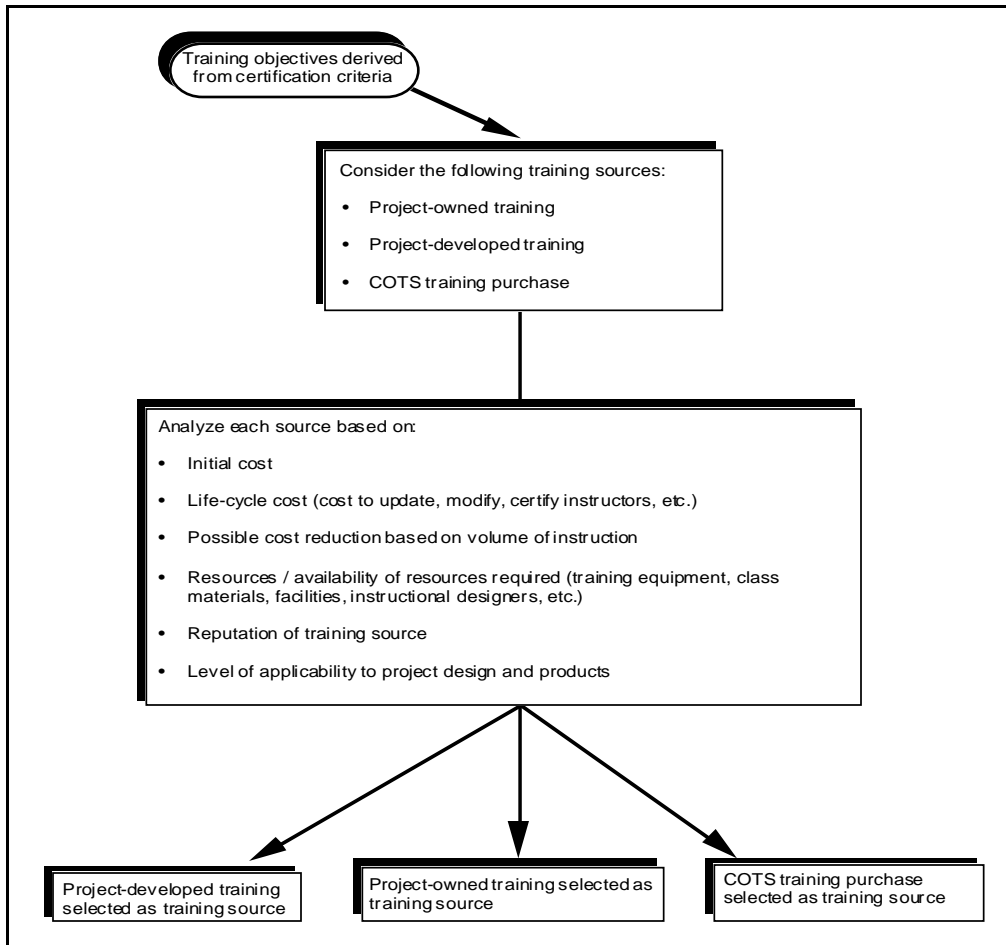
Figure 3.4.1.3-1. Training Source Selection Procedure

3.4.1.3.1 Course Development

Most of the FOS operational training will be supplied by the FOT. Training on the FOS applications, toolkits and applications program interfaces (API) will be developed with FOT resources. Figure 3.4.1.3.1-1 depicts the course development process.

As of the publication date of the Training Plan, the FOS Release B Release Readiness Review has not occurred.   The FOT has only had minimal experience with a engineering version of FOS Release B. Further familiarity with the FOS system will be required to identify the training requirements for each position, along with final course objective and requirements. It is planned that a change to the Training Plan will occur when the Training Materials are developed that will identify the training requirements for each position, along with course objectives, and course requirements.

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│                    │ FOT-developed training│                     │
│                    │ selected as training  │                     │
│                    │ source                │                     │
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│              ┌────────────────────────────────┐                  │
│              │ Training development plan produced│                │
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│     │                                                  │         │
│     │ Execute training development plan--produce the    │         │
│     │ following:                                        │         │
│     │    •  Classroom Objectives                        │         │
│     │    •  Training Material (include course objectives,│        │
│     │       outline, Student Guide, practical exercises) │        │
│     │    •  Reference Documentation                      │        │
│     │    •  Positional training tools                    │        │
│     │    •  Audio Visual Aids(Slide Presentation)        │        │
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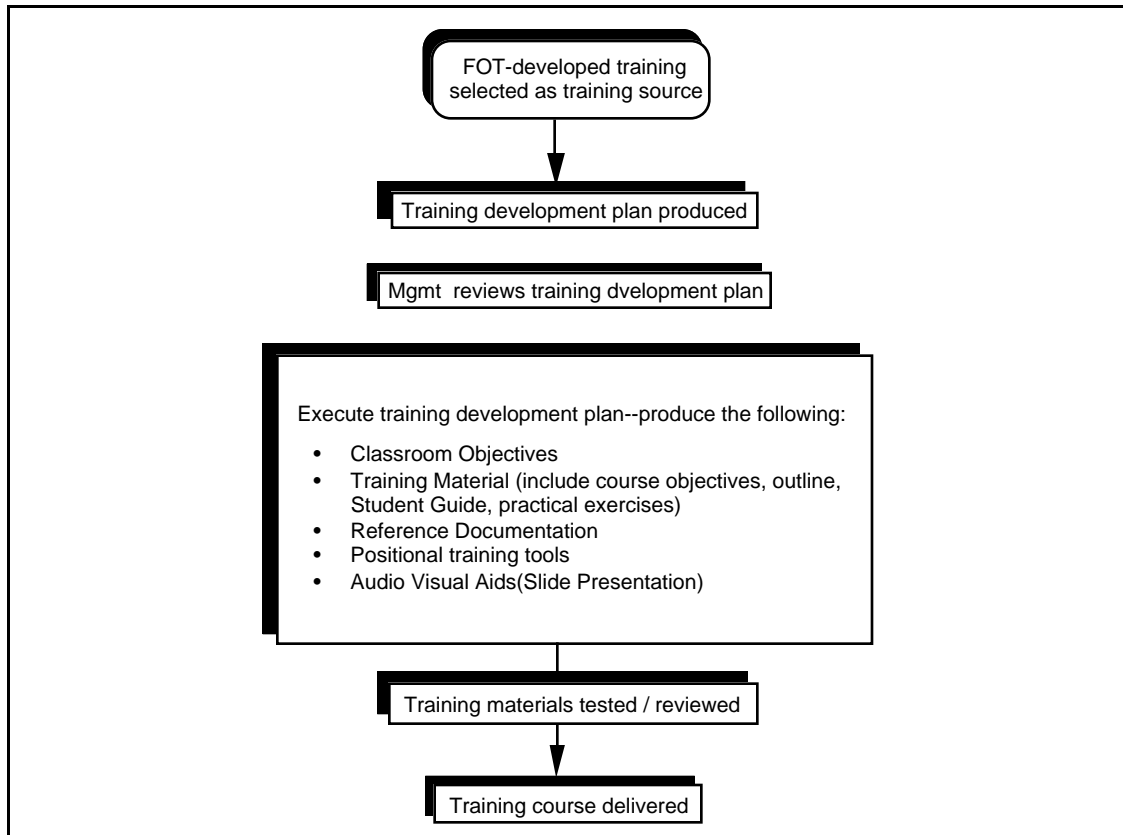
Figure 3.4.1.3.1-1. Course Development Procedure

3.4.1.4 Facility Requirements

The FOT training program will require the availability classrooms at NASA GSFC Building 32, or the Hughes ECS facility as a backup location. Classroom spaces will be chosen to meet the following requirements:

•   Adequate lighting for students (50 lumens per square foot at eye level recommended).

•   Table space for each student to be able to use charts of at least 11"X17" in size.

•   Space per student necessary to provide a comfortable learning environment, and to comply with local, state and federal fire and safety regulations.

•   Standard classroom equipment (i.e., overhead projector, white board, etc.) provided from site training resource pool or other local source.

Training in the EOC will also be required. Some hands-on FOS technical training will occur. Since a separate pool of equipment for training does not exist, it is not expected that operations equipment will be relocated for such training.

Training use of operations equipment will be scheduled to avoid impact to operations. When training space and equipment requirements clash with operational requirements, operational requirements shall have priority.

3.4.1.5 Instructor Preparation

Instructors for the FOS courses will be provided by the FOT. Instructors will be certified to ensure that they are adequately prepared to instruct, prior to conducting training. Instructor certification criteria is established by FOT Management and the Training Coordinator. Records of instructor certification will be maintained by the Training Coordinator.

Recertification of instructors will only be required with substantial changes in courseware. In the majority of cases, certified instructors will be provided with any minor changes to courseware, and will not be required to recertify.

3.4.1.5.1 OJT Instructor Certification

OJT instructors are experienced individuals chosen by FOT management to perform OJT. OJT programs will generally provide materials for one-on-one or small group training, and will not require formal classroom instruction. The certification of OJT instructors therefore, will be limited to a brief session(s) between the OJT instructor and FOT management to ensure that the OJT instructor understands how to use the materials, conduct and administer the program, record results and conduct any certification testing required.

3.4.1.5.2 CR Instructor Certification

Formal classroom instruction will be conducted by the senior FOT staff. Prior to teaching in the classroom, the instructors will have completed the certification testing for their subject ensuring that they are familiar with the course materials and practical application exercises.

3.4.1.6 Post Course Evaluation & Feedback

Following the completion of training, students will complete feedback forms which will be archived by the FOT training organization. Certification and re-certification test results will also be used to evaluate training effectiveness.

3.4.1.7 Training & Certification Records

DID 525 requires that training and certification records be maintained by FOT management and made available for NASA inspection. The FOT Training Coordinator will be responsible for maintaining the original records of all FOT training and certification.

3.4.1.8 Training Objectives Modification

Training objectives related to a particular function will be modified based on any change in certification criteria. If new training objectives are not covered in the existing recommended

training path to certification, then courseware may require modification, or new courseware may need to be purchased or developed.

3.4.2 Training Program Development/Non-Certification Related

Training for non-certifiable positions will be designed to ensure that these individuals receive information necessary to conduct functions required of their positions. Information on which to base training requirements will be derived from various sources, and the testing of these individuals will not be conducted.

3.4.2.1 User Training

User training (Instrument Operations Teams [IOTs] and S/C Manufacturer operations and engineering staff) needs will be addressed by the FOT Training organization and the AM-1 FOD. The FOS will produce a user guide as a part of the FOS Release B system.

3.4.2.2 NASA Management and Technical Personnel Training

NASA management and technical personnel may require training at both the user and basic operator levels. For any training requirements, spaces in FOT conducted training will be offered to these individuals.

3.4.2.3 IV&V Personnel Training

IV&V contractor personnel may require training at both the user and basic operator levels.

3.5 Training Schedule

Formal CR training is planned to occur, in conjunction with AM-1 training from the S/C manufacturer in the February to March 1998 time frame. By combining the FOS and AM-1 S/C manufacturer training, economies of scale will be achieved along with a synergy of presentation by presenting the training for the complete system. Specific dates for the training will be determined by agreement with NASA, FOT Management, and the AM-1 S/C manufacturer.

The FOT has already participated in a number of informal training exercises. The following is a summary of informal training exercises that have occurred up to the publication of the Training Plan.

FOT received hands-on experience/training during following S/C tests:

•   1/97: EOC Compatibility Tests (ECT1)- Hardline test

•   6/97: ECT2- ETE test

•   6/97: TDRS RF Compatibility Tests

FOT provided/received hands-on experience/training during following Ground System tests:

•   3/97-4/97: FOS/FOT provided FOS Release A Training to IOTs.

- 6/97: FOS/FOT provided FOS/IST connectivity support.

- 6/97: FOT tested contents of FOS User's Guide against FOS Release. B S/W

Operations CM process currently in place, the following CIs are under CCB control:

- 24 Spacecraft bus displays

- 7 Standard Operating Procedures

- 1 Activity

Plans for future FOT training include the following:

8/97 - Launch:	Operations CIs development
9/97 - Launch:	Operational Exercises
9/97 - 10/97:	IST Release B Deliver and Training
12/97 - Launch:	Integrated Simulations
1/98 - Launch:	S/C Tests
2/98 - 3/98	Classroom Instruction

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4. Training Population

The training population is comprised of two broad groups: FOT operator personnel and support personnel. Operator personnel includes all ECS FOT personnel with system critical day-to-day operational interfaces or maintenance functions related to the FOS system. Support personnel include ECS personnel who support the FOS operation but do not provide critical day-to-day operational interface with FOS. For detailed descriptions see the Maintenance and Operations Manual for the ECS Project (DID 607).

Operator personnel include:

- FOT operations staff

Support personnel include:

- Integrated Logistic Support (ILS) ECS EOC H/W Maintenance staff

- Instrument Operations Team (IOT) personnel

- S/C manufacturer operations and engineering staff

- IV&V contractor personnel

- NASA management and technical personnel

- Successor contractor personnel

4.1 FOT Staff

The following FOT staff positions represent operational positions that will require training under this plan.

- Off-Line Engineers

- On-Line Engineers

- Operations Coordinator

- Mission Planner

- Schedulers

- Operations Controllers

- S/C Activity Controllers

- Database Administrator / Simulations Specialist

- Automation Specialist

- System Administrator

- Jr. System Administrators/Computer Operators

The following FOT staff positions represent support positions that will require training under this plan.

- FOT Management

- Administrative Assistant

- CM/PA Coordinator

- Training Coordinator

4.2 ILS Staff

The following ILS staff positions represent support positions that will require training under this plan. Those positions include:

- EOC H/W Maintenance Coordinators

4.3 Instrument Operations Team Personnel

The FOT will provide the FOS-specific training to the Instrument Operations Team (IOT) personnel. Specific training needs will be addressed for IOT personnel who will be located in the EOC during the launch and activation periods.

4.4 S/C Manufacturer Operations and Engineering Staff

The S/C manufacturer support personnel include operations specialists and sub-system engineers. This staff will be located in the EOC prior to launch till about 90 days after launch. The FOT will provide the FOS-specific training to the S/C Manufacturer Operations and Engineering staff necessary to conduct pre-launch testing, launch, and early orbit operations.

4.5 IV&V Contractor Personnel

The FOT will provide the FOS-specific training to IV&V contractor personnel necessary to conduct verification and validation tests. These personnel are expected to be experienced with software engineering methodology, software languages, testing methodology and techniques, CASE tools, selected ECS COTS, and UNIX operating systems.

4.6 DAAC M&O Personnel

DAAC M&O personnel are those individuals at the GSFC DAAC that perform functions associated with FOS. These individuals will be offered the opportunity to attend FOS courses which relate to the FOS interface with the DAAC.

4.7   NASA Management and Technical Personnel

NASA management and technical personnel are NASA employees with an interest in the operations of the FOS system. These individuals will be offered the opportunity to attend FOT training courses.

4.8   New Employee Orientation

New FOT employees are briefed on the FOT Training Program by the Training Coordinator within 10 days of their date of hire at ECS. During this briefing, the Training Coordinator identifies the training and certification requirements for the new employee's position, identifies the specific training materials and provides training schedule information.

4.9   Successor Contractor Personnel

Successor contractors include any non-ECS team organization that assumes operational responsibility for the FOS system at the EOC. Training will be offered to these contractors to ensure a smooth transition with minimal impact on operations. Specific training courses for successor contractors are addressed in Tables 5-1 and 5-3 for Release B.

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5. Release B Training Program

5.1   Scope of Release B Training

The FOS Release B training will provide operation training necessary to operate the FOS Release B system by the FOT at the EOC.   The Release B training will consist of 3 types of training (CR, OJT, and Informal Training).   The formal training program will be based on classroom instruction using FOT developed course curriculum. Classroom and OJT instruction will be supplemented by informal training which the FOT will receive by experience gained from supporting acceptance testing, ECT Testing, EGS Testing, simulation, and verification & validation testing. All training material developed for Release B will be used as the curriculum foundation for training required on subsequent releases.

5.2   Release B Training Approach

The FOT Training Courses will be grouped into modular lessons based on common task groupings, operational and positional requirements. (The Training Course Outline (DID 625/OP3) will provide a detailed description of the course outline). Release B training for FOT personnel will include the following topics:

•   ECS Introduction and FOS System Overview - Provides an overview of ECS and the FOS Release B and its subsystems. Emphasis will be placed on the FOT and their role in interacting with the FOS.   Additional information will be included on all FOS COTS software and hardware.

•   Routine and Contingency Operations - Provides a detailed description of the different tasks needed during Routine and Contingency Operations of the FOS Release B by the FOT.

•   External Interfaces - Provides a detailed description of the different tasks needed to maintain the External Interfaces which the FOT will maintain during operations of the FOS Release B. These External Interfaces include EDOS, NCC, ETS, FDD, and the DAAC.

•   Network Administration - Provides a description of the different tasks that are needed in order to monitor the performance of the network.

•   Database Administration - Provides a detailed description of the different tasks required to maintain the database and structure management for FOS.

•   Configuration Management - Provides a description of the different tasks that need to be accomplished in order to: record and manage proposed and approved Configuration Change Requests (CCR); record, report, manage and distribute changes to custom FOS software, database control files; record, report and maintain system-level changes to the as-built operational baseline; and generate the Configuration Status Accounting Records (CSAR).

•   System Troubleshooting and Problem Management - Provides a detailed description of the different operational tasks that are required in order to perform system troubleshooting, and

the tasks required to report a problem. This includes a detailed review of the system monitoring capabilities, troubleshooting process and trouble ticket set-up and processing.

- System Operations - Provides the FOT an opportunity to perform real-world exercises on FOS Release B with the AM-1 Spacecraft Simulator (SSIM) and the EOSDIS Testing System (ETS). This will consist of scenarios that depict real situations and will serve to test each operators ability to respond appropriately to the given situation.

5.2.1 Release B Training Conduct

The initial FOT Training Courses for Release B will be presented to the FOT in support of the operational readiness plan. The Release B training will include all lessons as defined by the lesson objectives contained in CDRL 625 ECS Training Materials. When applicable, System Administrators and Database Administrator will attend selected COTS HW/SW vendor training courses. These courses will be used to supplement the FOT Training Courses and to expand the knowledge base of the FOT organization.

Formal FOS Release B training will be combined with AM-1 Spacecraft training that will be provided by the AM-1 Spacecraft manufacturer. Formal training knowledge reinforcement will be accomplished by the informal training experience gained during support of acceptance, verification and validation testing and performance of operational readiness exercises, and simulations.

5.2.2 Training Checklist

A Training Checklist will be maintained for all FOT training participants. Although senior technical staff may conduct formal checklist training, management is responsible for all checklist training. When a task, sequence, or procedure has been completely covered and the employee has demonstrated proficiency, the instructor for that checklist entry will initial the space next to it.

When all applicable checklist spaces have been initiated, the student is ready for checkout. The Training Coordinator will make the necessary arrangements to conduct a formal checkout of the employee no more than 5 working days after all checklist entries have been initialed.

Management, or their delegate, will observe the employee performance of each of the tasks and procedures on the checklist. Any deficiencies, errors, or omissions are noted on the checklist by the Training Coordinator. After all items are initiated the employee has completed checklist training.

Following the evaluation, the Training Coordinator reviews the checklist with management. Together, they identify and note the possible reasons for the discrepancies and take action to correct them. A copy of the completed checklist is retained by the Training Coordinator as a record of successful completion of checklist training.

5.2.3 Additional FOT Training

After the preliminary Release B training has been completed, additional training MAY be required to satisfy normal operator re-certification requirements. The re-certification training

will be accomplished by scheduling and conducting a series of informal OJT courses. Experts from the core group of certified operators will be selected by the FOT Management and the Training Coordinator to conduct the OJT effort.

The Training Coordinator may determine that multiple operator positions require re-certification or due to attrition, new hires have increased the volume of training requirements beyond the capabilities of using the existing staff to conduct informal OJT. In this case, the FOT Training Coordinator will schedule a training course.

5.3   Description of Performance Goals for Release B

There are specific performance goals for each training population. For FOT personnel, attainment of these goals will result in certification. For all other population groups, performance goals are the attainment of the knowledge necessary to effectively conduct FOS functions essential to their positions.

5.4   Release B Training Requirements

The training requirements for Release B are derived from the system design and the operations concept. The lesson topics listed in Tables 5-1 were chosen based on the processes described in Section 3. In addition to these subjects, the training program will include operation training and participation in operations exercises and system rehearsals prior to AM-1 launch.

5.5   Release B Course Descriptions & Resource Requirements

Table 5.5-1 lists the projected Release B lesson topics, provides a brief description of each lesson topic, lists the training source, provides an estimated course length (Hours), provides an estimate of the equipment utilization (lab time) time (Hours), and provides an estimate of the resources required to conduct the classroom discussion and to conduct practical exercises on the operational equipment.

Table 5.5-1. Release B Training Course Descriptions & Resource Requirements

Lesson Topics	Description	Training Type/Course Hours	Release B Equipment Utilization	Resource Requirements
ECS Introduction and System Overview	General system overview.	Dev/4 Hours	0 Hours	1 Classroom
FOS Release B Overview	FOS and FOS subsystems	Dev/32 Hours	8 Hours	1 Classroom, 5 workstations with FOS access
Routine and Contingency Operations	Describes FOT tasks needed during Routine and Contingency Operations	Dev/24 Hours	6 Hours	1 Classroom, 5 workstations with FOS access
External Interfaces	Describes tasks to maintain FOS External Interfaces (EDOS, NCC, ETS, FDD, and the DAAC)	Dev/16 Hours	4 Hours	1 Classroom, 5 workstations with FOS access
Problem Management MSS & CSS Overview	Describes the trouble ticket process. Subsystem functions and components	Dev/4 Hours	2 Hours	1 Classroom, 5 workstations with FOS, MSS, & CSS access
Network Administration	Describes process for monitoring the network. Subsystem functions and components	Dev/4 Hours	2 Hours	1 Classroom, 5 workstations with FOS access
Database Administration	Describes tasks required to maintain the database and structure management.	Dev/8 Hours	4 Hours	1 Classroom, 5 on-site workstations with FOS access
Configuration Management	Describes configuration management process.	Dev/4 Hours	2 Hours	1 Classroom, 5 workstations with FOS access
System Troubleshooting	Describes tasks required to perform system troubleshooting.	Dev/4 Hours	2 Hours	1 Classroom, 5 workstations with FOS access
System Operations	Provides the operators real-world exercises on FOS.	Dev/32 Hours	12 Hours	1 Classroom, 5 workstations with FOS, SSIM, and ETS access

6. Certification Plan

6.1 Introduction

This section sets forth and defines the policies and requirements of the ECS FOT Certification Program, and provides direction for the certification of FOT personnel. The purpose of the FOT Certification Program is to ensure that acceptable levels of proficiency are achieved by FOT personnel performing direct real-time operations support of the AM-1 mission. Individuals, unless directly supervised, will perform only those duties for which they are certified.

The Certification aspect of the FOS Training Program provides the rationale, procedures, and documentation for training and certification of FOT Personnel. Certification indicates successful completion of all training requirements and demonstrated proficiency.

The FOT training program specifies training and documentation required for certification for AM-1 mission operations. Formal documentation coupled with standard review procedures provide an essential basis for evaluation of training effectiveness. Training specifications, standards, and documentation and formal review procedures provide the guidelines necessary to update and revise the training program.

6.2 Certification Process

The certification process is an important component of the FOT training process. The steps of the certification process are depicted in Figure 6.2-1.
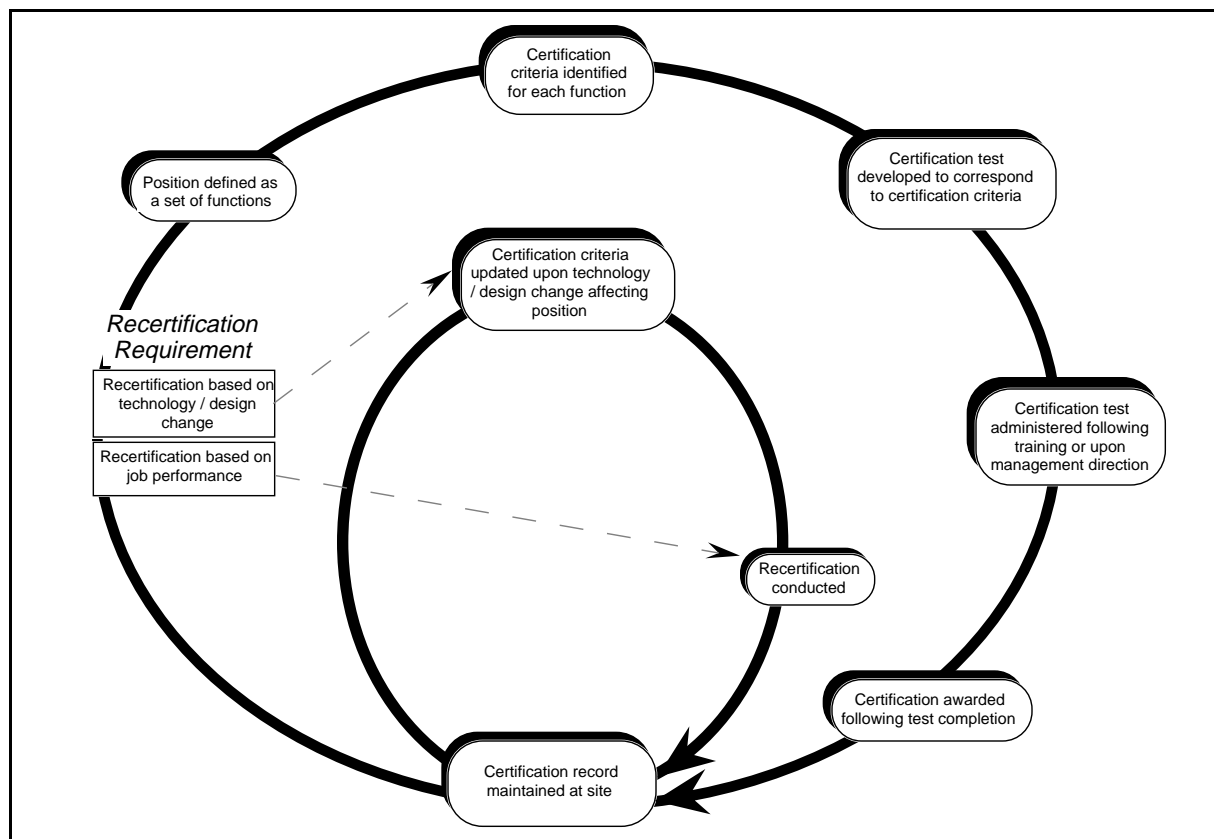
Figure 6.2-1. FOT Certification Process

6.2.1 Certification Criteria Identification

Detailed descriptions of FOT operations functions serve as the basis for identifying certification criteria. Each function will have a list of associated certification criteria. An FOT position will have at least one of these lists, but in cases where a position encompasses more than one function, additional lists will be developed.

Certification criteria are the skills and knowledge required to reach minimum acceptable performance standards. All training and testing will be based on these criteria.

Certification is the verification, through performance and/or written evaluation, that an individual meets a minimum level of proficiency necessary to perform the duties associated with a system/subsystem or position.

All certifications must have an associated skills catalog that contains the measurable descriptions of all the tasks/skills and knowledge involved in performing the duties of a particular position.

6.3 Certification Population

The certification population is composed of FOT operator personnel. Certification positions include:

- Off-Line Engineers

- On-Line Engineers

- Operations Coordinator

- Operations Controllers

- S/C Activity Controllers

- Mission Planner

- Schedulers

- Database Administrator/Simulation Specialist

- CM/PA Coordinator

- Automation Specialist

- System Administrator

- Jr. System Administrators/Computer Operators

6.4 Certification Testing Policies and Procedures

Certification tests will be developed to test proficiency in functional areas defined by certification criteria. Primary responsibility for developing certification tests belongs to the FOT training organization.

In most cases, the certification test for a FOT position will be a series of tests or practical application checklists that will be administered following each training course in the recommended training path to certification. These same tests will be used to determine if FOT personnel are experienced enough to place out of certain training. Certification is officially accomplished upon the completion of all certification testing and successful participation in Operations Exercises preceding the AM-1 launch.

6.4.1 Recertification

Recertification will be required in the following cases:

- Change in technology or design which changes skills required in a function (i.e. new system release).

- Demonstrated deficiency in executing an assigned function.

FOT management will have the option of recertifying without retesting in cases where an individual has been performing adequately in a function, and there has not been any significant design change impacting job duties.

6.5   Certification Skills Catalog

Preparation of skills catalogs is the responsibility of the FOT Management. They are responsible for generating and maintaining the skills catalog for positions under their control. FOT management will submit the skills catalogs to the Training Coordinator for format and processing. The Training Coordinator will complete the formatting and processing, makes recommendations as necessary, then returns the skills catalog to the appropriate FOT manager for final approval, publication, and distribution.

6.6   Awarding Certifications

General requirements, and certification are the responsibility of FOT management. Applicable skills contained in the catalogs are checked off, dated, signed, and retained by Training Coordinator.

6.7   Student Failing to Achieve Certification

In the event that a member of the FOT fails to achieve certification, FOT management will develop a plan for remedial training, determining the length of time before a second opportunity will be offered for certification.

6.8   Criteria for a Certifiable Position

A certifiable position is one authorized under the ECS contract for the FOT, and is deemed critical to the AM-1 mission because it meets the following criteria:

- The position is in direct, real-time support of the AM-1 mission.

- EOC Maintenance Coordinators who maintain equipment/systems which are in direct, real-time support of AM-1 mission.

- The nature of the a position is such that the actions of an individual are capable of having a direct and immediate impact on the progress of the AM-1 mission without provision for review, approval, or direct modification. This is in contrast to a position where the work product is subject to review, revision, and approval prior to its having the potential to impact the mission. Personnel filling managerial, clerical, and support positions will not be certified.

 These criteria will be used to identify all certifiable positions. Operator personnel will normally be certified by position (e.g., job title). Although an individual may not be assigned simultaneously to more than one position, it is permissible to be certified in more than one certifiable position. Wherever practical, this is encouraged to ensure required staffing flexibility.

Each certifiable position will have one or more skills catalogs associated with it. Each catalog identifies the tasks and knowledge required to perform in that position/system. Each task will be presented in a measurable description (e.g., capable of being observed/tested). The successful demonstration of each measurable description will be documented in the skills catalog by the supervisor. To be certified in a position or system, each candidate will formally demonstrate the knowledge and ability to perform all tasks listed in the appropriate catalog.

6.9 OJT Instructor Certification

OJT instructors are experienced individuals chosen by FOT management to perform OJT. OJT programs will generally provide materials for one-on-one or small group training, and will not require formal classroom instruction. The certification of OJT instructors therefore, will be limited to a brief session(s) between the OJT instructor and FOT management to ensure that the OJT instructor understands how to use the materials, conduct and administer the program, record results and conduct any certification testing required.

6.10 CR Instructor Certification

Formal classroom instruction will be conducted by the senior FOT staff. Prior to teaching in the classroom, the instructors will have completed the certification testing for their subject ensuring that they are familiar with the course materials and practical application exercises.

6.11 Cross-Training Certification

Since a standby force of certified personnel to be used during vacations, holidays, or sick leave, is not employed, positions left temporarily vacant will be filled by other certified personnel. The capability required to provide this support will be achieved through multiple certification. This is obtained by cross-training personnel into two or more certifiable systems or positions.

6.12 Certification Currency

Personnel who have not, within the past 12 months, occupied and performed in the position for which they were originally certified are required to be recertified as outlined in paragraph 6.13.

6.13 Reduction or Termination of Certification

An individual's certification on position will be reduced or terminated if upon evaluation by FOT Management, the individual fails to maintain the minimum job level performance standards contained in the applicable skills catalog.

All reductions in certification or termination of certification shall require that a copy of the Certification Record be made with annotations in the remarks area stating the certification change and date with accompanying local management signatures.

6.14 Recertification

An individual whose certification to perform on a position has been reduced or terminated may be recertified for that position. The level of proficiency is the same for recertification as it is for the initial certification. All recertifications are to be recorded in accordance with paragraph 4.2.

Once certified in a position, an individual will be recertified based on the following criteria:

- Recertification is required if an individual is absent from his/her position for 12 months or more.

- Recertification may be required when modification/enhancements cause a change in the existing skills catalog.

- Recertification may be directed by FOT Management for selected certifiable positions prior to new missions being supported by the FOT. (Note: This is applicable to FOS Releases beyond Release B.)

- Recertification may be directed any time the supervisor determines that any employee assigned to a certifiable position is not fully qualified in that position.

- Routine recertification may be directed by FOT Management as deemed necessary.

6.15 Certification Modification

Certification criteria will be modified to reflect changes in functions and responsibilities associated with changes in technology or design. Criteria may also be modified based on a management decision that current criteria are inadequate.

6.16 Training Organization Certification Responsibilities

The FOT training organization is responsible for the following:

- Administering, controlling, and evaluating the certification program.

- Writing, publishing and distributing skills catalogs for formal courses of study which are part of the FOT training curriculum.

- Awarding Certification as a result of completing the formal FOT course of instruction.

- Preparing and distributing screening tests.

- Initiating and maintaining certification records, and skills catalogs for graduates of the FOT training program.

- Maintaining an FOT Certification Record database.

6.17 FOT Certification Record

A certification record is completed when an employee is initially certified and for any of the following changes in certification status:

- Progression to a higher certification level.

- Award of additional certifications.

- Recertification.

- Termination of Certification

The Training Coordinator will be responsible for maintaining a certification record for each FOT member who is assigned to a certifiable position. Upon completion of the certification process,

or upon a change in certification status, the training coordinator will forward a copy of the certification record to the individual and their appropriate manager.

The following information will be maintained in a certification record located in the Certification Record database:

- Last Name, First Name, Middle Initial

- Employee Number

- Current Position/ Full Title, e.g., Operations Coordinator

- New Position/System: Full Title of Position/System for which the employee is certified.

- Date Completed: Insert the date when all skills of a certification level contained in the skills catalog has been successfully completed.

- Skills Catalog

- Evaluator's Signature/Position: This person can be the Supervisor, Shift Leader, designated OJT Trainer, etc.

- Date of Certification Test

- Test Score: Insert the individual's percentage score of the written test. Oral tests will be graded on a pass/fail basis.

- Training Hours Required: Indicate the actual total number of training hours that the individual needed to successfully complete certification.

- Remarks/Requirement Waivers: Provide relevant information to substantiate the performance and written and oral evaluation data.

- Signature of Manager

A complete checklist qualifies employees for formal certification in the position defined. The Training Coordinator ensures that a certification form is prepared and completed within 5 working days of the successful completion of checklist training.

Copies of the certification form are given to the employee, and placed in the employee's department folder. The Training Coordinator promptly adds the names of newly certified employees to the appropriate position logs. The Training Coordinator include these names in the cross-training report, and the training status report.

6.18 Operator Certification

Operator certification requires demonstrated proficiency to perform mission related operations. Individuals at this level function under technical direction to ensure error-free performance and skill progression. FOT management is responsible for awarding operator certification. Normally, operator certification is acquired through classroom training and on-the-job-training (OJT).

Certification is awarded to personnel who have achieved the following:

- Successful completion of all general requirements.

- Demonstrated proficiency in all skills listed in the operator portion of the applicable skills catalog.

Abbreviations and Acronyms

AM-1   EOS AM Mission spacecraft 1, morning spacecraft series—ASTER, CERES, MISR, MODIS and MOPITT instruments

API   Applications Program Interface

CBT   Computer Based Training

CCB   Configuration Control Board

CDRL   Contract Data Requirements List

CM   Configuration Management

COTS   Commercial Off-the-Shelf

CR   Classroom presentation equipment

CSCI   Computer Software Configuration Item

DAAC   Distributed Active Archive Center

DBA   Database Administration

DCN   Document Change Notice

DID   Data Item Description

ECS   EOSDIS Core System

EOC   EOS Operations Center

EOSDIS   Earth Observing System Data Information System

ETS   EOSDIS Testing System

FOS   Flight Operations System

FOT   Flight Operations Team

HW   Hardware

IDR   Interim Design Review

ILS   Integrated Logistics Support

IOT   Instrument Operations Team

IV&V   Independent Verification and Validation

LAN   Local Area Network

M&O   Maintenance and Operations

MSS	Management Subsystem
NASA	National Aeronautics and Space Administration
NMOS	Network and Mission Operations Support
ORPA	Operations Readiness and Performance Assurance
OJT	On-the-Job Training
PDR	Preliminary Design Review
PI	Principle Investigator
SE	Sustaining Engineering
SME	Subject Matter Expert
SMO	System Management Office
SSIM	AM-1 Spacecraft Simulator
SW	Software
TTT	Train-the-Trainer